



National Institute of Food and Agriculture
www.nifa.usda.gov

Research at the USDA: Addressing Societal Grand Challenges

Joint Annual Meeting, 2010 Denver, CO

INVESTING IN SCIENCE | SECURING OUR FUTURE



National Institute of Food and Agriculture
www.nifa.usda.gov

USDA Genesis as a Science Agency

- 150th Anniversary in 2012
- Created by President Lincoln as “The People’s Department”
- Network of Land Grant Colleges and Universities
- Network of Agricultural Experiment Stations
- Science Integrated with Extension and Education
- Before WWII, 40 Percent of USG R&D Investment



National Institute of Food and Agriculture
www.nifa.usda.gov

USDA Strategic Goals

- Help America promote agriculture production and biotechnology exports as America works to increase food security
- Ensure that all of America's children have access to safe, nutritious, balanced meals
- Assist rural communities to create prosperity so they are self-sustaining, repopulating, and economically thriving
- Ensure our National Forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources



National Institute of Food and Agriculture
www.nifa.usda.gov

Five Pillars for the Secretary's Vision Creating Rural Prosperity

- Increasing access to broadband and continuous business creation
- Developing local and regional food systems
- Capitalizing on climate change opportunities
- Developing renewable energy
- Generating and retaining green jobs through recreation and natural resource restoration, conservation, and management



National Institute of Food and Agriculture
www.nifa.usda.gov

Research at USDA

Research, Education, and Economics

- Agricultural Research Service
- Economic Research Service
- National Institute of Food and Agriculture
- (Forest Service)

Foreign Agriculture Service

Animal and Plant Health Inspection Service

Food and Nutrition Services

(Research informs portfolio of others)



National Institute of Food and Agriculture
www.nifa.usda.gov



The role of the National Institute of Food and Agriculture is to support research, extension and education, and bring focus to meet society's grand challenges

INVESTING IN SCIENCE | SECURING OUR FUTURE



National Institute of Food and Agriculture
www.nifa.usda.gov

NIFA

NIFA – the agency for extramural research, extension and education

- Built on the history of CSREES
- Expanding the role of AFRI, the competitive grants program
- Bringing focus to ‘capacity’ funds while maintaining essential services to rural and urban America
- Placing emphasis on attracting a new generation of scientists to the agriculture mission



National Institute of Food and Agriculture
www.nifa.usda.gov



INVESTING IN SCIENCE | SECURING OUR FUTURE

Why this is the right time for a change in research for agriculture

“The lessons of history led the Committee on a New Biology for the 21st Century to recommend that a(n) . . . initiative be put in place and charged with finding solutions to major societal needs: sustainable food production, protection of the environment, renewable energy, and improvement in human health. These challenges represent both the mechanism for accelerating the emergence of a New Biology and its first fruits.”



National Institute of Food and Agriculture
www.nifa.usda.gov

NIFA

Can NIFA be a 21st Century Life Sciences Agency?

- Seek broad participation in the goals of the agency, including those outside the usual cadre of scientists and educators
- Use broader systems approaches to solve problems presented to agriculture, while ensuring 'sustainability'
- Create a 21st century workforce that achieves societal goals while rejuvenating rural America and creating economic prosperity in agriculture around the globe



National Institute of Food and Agriculture
www.nifa.usda.gov

NIFA

Refocusing NIFA Research in 2010

Focuses the outcomes from NIFA-sponsored activities around thematic areas:

1. Climate change
2. Bioenergy
3. Food safety
4. Nutrition and childhood obesity
5. Global food security



2010 AFRI

Separate RFAs for 5 challenge areas:

1. Global Food Security
2. Childhood Obesity Prevention
3. Food Safety
4. Sustainable Bioenergy
5. Climate Change

- Most programs are integrated (research + education + extension)
- Interdisciplinary
- Larger awards (\$2.5 - \$45 million total depending on program)
- Longer duration (5 years) + some renewable



2010 AFRI

- **6th RFA:**

- **Foundational Program that supports 6 areas:**

1. Animal health, production, & animal products;
2. Plant health, production, & plant products;
3. Food safety, nutrition, & health;
4. Renewable energy, natural resources, & environment;
5. Agriculture systems & technology; and
6. Agriculture economics & rural communities.

- Disciplinary-based research to build a foundation of knowledge critical for solving current & future problems
- Larger award sizes compared to previous years



National Institute of Food and Agriculture
www.nifa.usda.gov



2010 AFRI

7th RFA:

NIFA Fellowships Grant Program

- Support next generation of agricultural scientists, educators and practitioners
- Pre- and Postdoctoral fellowship grants
- Up to \$ 6 million in 2010
- Proposal Deadline: Oct. 5, 2010



National Institute of Food and Agriculture
www.nifa.usda.gov



AFRI Budget - 2010

- Animal health, production and products \$49.4 mil
- Plant health, production and products \$52.4 mil
- Food safety, nutrition and health \$42.0 mil
- Renewable energy, natural resources, environ \$57.5 mil
- Agric. systems and technology \$21.5 mil
- Agric. economics and rural communities \$19.0 mil
- Legislatively authorized set asides \$20.7 mil



National Institute of Food and Agriculture
www.nifa.usda.gov

NIFA

Other Animal Programs

- **Formula Grants**
 - Research (Hatch Funds, Animal Health, Evans-Allen)
 - Extension (Smith-Lever, 1890 Institutions)
- **Congressional Line Items**
 - Special Research Grants
 - Federal Administration Research & Education Grants
- **Small Business Innovation Research (SBIR)**
 - Animal Production & Protection, Aquaculture



National Institute of Food and Agriculture
www.nifa.usda.gov



Animals-Related Priorities in 2010 AFRI RFA

INVESTING IN SCIENCE | SECURING OUR FUTURE



National Institute of Food and Agriculture
www.nifa.usda.gov



Climate Change: Mitigation, Adaptation, Education and Extension: 2010

- Impacts of Climate Change on Animal Health and Production
- Regional Approaches to Climate Change
- Climate Change Mitigation and Adaptation in Agriculture

Focus for 2010 on:

– Animal systems: swine, poultry



Food Safety: 2010

- Prevention, Detection, and Control of Shiga toxin-producing *Escherichia coli* (STEC) from Pre-Harvest through Consumption of Beef Products
- Microbial Ecology and Shiga toxin-producing *E. coli* (STEC) Shedding in Cattle



National Institute of Food and Agriculture
www.nifa.usda.gov



INVESTING IN SCIENCE | SECURING OUR FUTURE

Global Food Security: 2010

- Improving Sustainability by Improving Feed Efficiency of Animals
- Minimizing Losses from Animal Diseases with Major Impact on Production, Marketing, and/or Trade



National Institute of Food and Agriculture
www.nifa.usda.gov



INVESTING IN SCIENCE | SECURING OUR FUTURE

Sustainable Bioenergy: 2010

- High value co-product development
- Regional Approaches to Sustainable Bioenergy
- Stimulating a New Era of Students and Faculty in Bioenergy



Foundational Program: 2010

- **Animal Health and Production and Animal Products:**
 - Animal Bioinformatics & Development of Tools for Livestock, Poultry, and Aquaculture
 - Animal Reproduction
 - Animal Health
- **Agriculture Systems and Technology**
 - Engineering Approaches for Improved or Alternative Management Systems to Safeguard Animal Welfare



National Institute of Food and Agriculture
www.nifa.usda.gov



SUCCESS STORIES WITH HIGH IMPACT

EXAMPLE :

WHOLE GENOME-ENABLED ANIMAL
SELECTION – Curt Van Tassell et al
(ARS) + \$2.5M NIFA Funding



Development of a Bovine High-Density SNP Assay for “Community” use

- Why?
 - Increased accuracy in genetic prediction
 - Enhanced performance in *Bos taurus indicus*
 - Enhance QTL mapping precision
 - Identify across- breed linkage disequilibrium



(SNP contd.)

Data Highlights

- Represents:
 - ~180x genome-wide coverage
 - >300 animals
- Animals from breeds representing:
 - *Bos taurus taurus* and *Bos taurus indicus*
 - Beef and dairy
 - Temperate and tropically adapted
- ~45 million High SNP



Manure management issues

- **Continuing issues**

- Air quality, odors, particulates and gases
- Water quality, nutrients

Emerging issues

- Air quality, green house gases (GHG) (carbon dioxide, methane, nitrous oxide), ammonia
- Water quality, pharmaceuticals, hormones

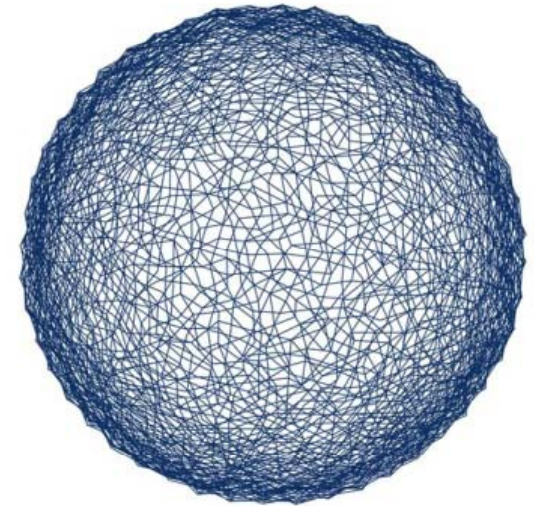


Funding for manure management

- 2008 funding based on the Current Research Information System (CRIS) data base
 - NIFA administered \$25 million
 - Includes competitive and special grants
 - State appropriations \$33 million
 - Other sources (federal, industry) \$26 million
 - Total \$83 million

The Global Research Alliance on Agricultural Greenhouse Gases

- Proposed in 2009 by New Zealand
- Development in partnership with the United States
- 21 countries at COP15 in Copenhagen endorsed a Joint Ministerial Statement on the Establishment of a Global Research Alliance on Agricultural Greenhouse Gases



COP15
COPENHAGEN
UN CLIMATE CHANGE CONFERENCE 2009



The Global Research Alliance on Agricultural Greenhouse Gases *in brief*

- **Understand GHG emissions from agriculture**
- **Improve measurement and estimation of GHG emissions and C sequestration**
- **Develop ways to reduce emissions**
- **Develop ways to increase C sequestration**
- **Mitigate GHGs while sustaining or enhancing productivity and resilience as climate changes**
- **Transfer new knowledge and technology to farmers/land managers worldwide**
- **Build scientific capacity in developing countries via partnerships**

Current Members as of March 30, 2010

- Argentina
- Australia
- Canada
- Chile
- Colombia
- Denmark
- France
- Germany
- Ghana
- India
- Indonesia
- Ireland
- Japan
- Malaysia
- Mexico
- Netherlands
- New Zealand
- Norway
- Peru
- Spain
- Sweden
- Switzerland
- United Kingdom
- United States
- Uruguay
- Vietnam

Proposed Structure: Three International Research Projects



Crop Systems



Paddy Rice



Livestock Systems

Benefits of the Alliance



- **Identify information and technology needs, which vary among countries.**
- **Coordinate and leverage scarce research resources.**
- **Highlight the need for increased investment in mitigation research.**
- **Research capacity building in developing countries.**
- **Information and technology transfer.**
- **International public-private partnerships.**



National Institute of Food and Agriculture
www.nifa.usda.gov



Who are the Next Generation of 'Agricultural Scientists'?

- Classical and advanced agricultural sciences
- Non-agricultural scientists (physicists, chemists, informaticians, nutritionists, biomedical scientists)
- Social, economic, policy making, communications



National Institute of Food and Agriculture
www.nifa.usda.gov

NIFA

Future Opportunities for Research through NIFA if Budgets Grow

- Challenge programs will continue
- Foundational programs will grow as resources grow: searching for a balanced portfolio (30-70)
- NIFA programs will be complementary and collaborative with research sponsored by NSF, NIH, DOE, CDC, and other agencies



National Institute of Food and Agriculture
www.nifa.usda.gov

Research at the USDA: Addressing Societal Grand Challenges

Joint Annual Meeting, 2010

Roger Beachy
Director, NIFA

INVESTING IN SCIENCE | SECURING OUR FUTURE